ALTICINAE OF CALIFORNIA, PART I: *EPITRIX* SPP. (COLEOPTERA: CHRYSOMELIDAE)

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Abstract

Four species of *Epitrix* are known to occur in California. They are viewed with respect to economic aspects, taxonomy, and distribution. The spermathecae of the females are described and illustrated. Two heretofore difficult to separate species are compared.

Introduction

The genus *Epitrix* is a widely distributed and economic group of flea beetles of small size and uniform appearance. The known host associations are with the family Solanaceae. Larvae develop below the soil surface, feeding on the root system, and adults live above the surface, feeding on leaves and stems. *Epitrix* is a relatively large genus, with more than 90 species recorded from all continents (except Antarctica).

Three species, *Epitrix hirtipennis* (Melsheimer), *E. similaris* Gentner, and *E. subcrinita* (LeConte) have previously been recorded from California (Leng 1920; Gentner 1944; Blackwelder & Blackwelder 1948). In his 1944 paper on *Epitrix*, Gentner also described *E. tuberis* and listed the distribution as Colorado, western Nebraska, Washington, and Oregon. We confirm this distribution and add the following: Idaho, Arizona, New Mexico, Wyoming, British Columbia, and California.

In recent years, California state survey entomologists have made collections of *E. tuberis*, a serious pest of potato tubers, in Del Norte and Siskiyou counties, California. How it came into California is not known, but it is likely that entry is recent and due to mechanical transport by man. The assumption of recent entry is based on the absence of specimens in collections with dates earlier than 1969. Several dozen collections of *tuberis* have been made in the past few years and all have been from backyard gardens and associated with tomato. Investigations have shown that the seedling stock for these plants came from nurseries in Medford and Ashland, Oregon. The presence of *tuberis* in Medford Valley was noticed in 1966 (Gentner, personal communication), and it is logical that it entered California in the larval stage in soil around seedling tomatos.

The external similarity of *E. tuberis* and *E. similaris* makes separation difficult, but the distinctiveness of the female spermatheca described and illustrated herein, and to a lesser extent the male genitalia, allows easy and positive separation.

This paper is a forerunner of a more extensive review of the genus for North America, so a minimum of synonymical information is presented. Distributional information and comparison of 2 morphologically similar species, *E. similaris* and *E. tuberis*, are stressed.

Economic Importance

All 4 species of *Epitrix* which occur in California are of economic importance. They are primarily associated with solanaceous crops such as potato, tomato, tobacco, and eggplant. Adults intermittently appear on beans (*Phaseolus* spp.), sugar beets, and cucurbits when a solanaceous host is unavailable.

Damage by adults may be characterized as riddling of the foliage with small round holes. Larvae feed on sub-surface parts of the plant and pupate in the soil. In the case of *E. tuberis*, greatest injury is caused by larval damage to tubers, and adult feeding injury to the foliage is secondary (Gentner 1944).

Epitrix larvae have been reported as vectors of organisms or agents that cause potato scab, spindle tuber virus, and rhizoctonia root rot (Leach 1940).

Methods & Materials

The female spermatheca was removed by breaking off the abdomen of the dry specimen. This was heated in Essig's aphid fluid, carefully cleaned, dissected in hot fluid, and then placed on a microscope slide.

Hoyer's medium, although not as permanent as balsam, was used for a number of reasons. Hoyer's is water soluble and nearly the same viscosity as the aphid fluid, permitting transferral to the mounting medium. This saved time and practically eliminated breakage.

Specimens Examined: over 4,000 *Epitrix* from western United States. More than 2,500 of these were from California. Approximately 15% of all material was dissected and the spermathecae examined. Each locality shown on the distribution maps (Fig. 13-16) represents an identification by examination of gross morphological characters and at least one (up to 15% of the series) spermathecal dissection.

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Genus *Epitrix* Foudras

Epitrix Foudras 1859: 147 (Type: *E. atropae* Foudras 1860 [designated as type by Maulik 1926:133]). Oblong-ovate, convex alticines with 11-segmented antennae, open procoxal cavities, and semi-erect hairs on the

elytra. Pronotum with distinct antebasal transverse impression interrupted by longitudinal furrows laterally.

The following names for components of the spermatheca are modified from Samuelson (1966, and personal communication): *appendix* (a), *gland valve* (gv), *pump* (p), *receptacle* (r), *spermathecal duct* (2 parts), *sclerotized spermathecal duct* (sd), and *non-sclerotized spermathecal duct* (nd). The sclerotized portion of the spermathecal duct lies between the receptacle and the gland valve; the non-sclerotized portion is distad of the gland valve.

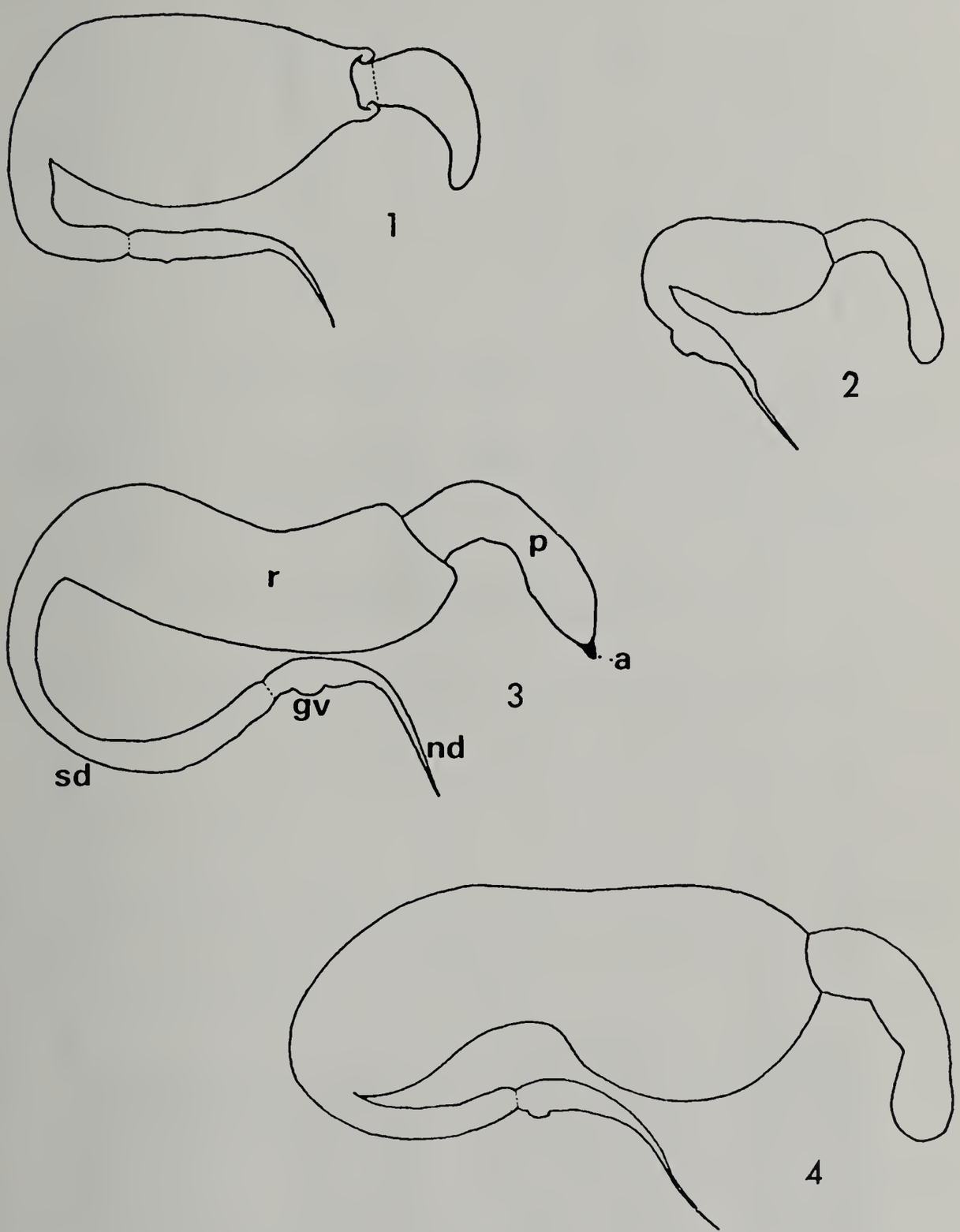

Fig. 1-4, Spermatheca: 1) *Epitrix hirtipennis* (Melsh.); 2) *E. tuberis* Gent.; 3) *E. subcrinita* (LeConte); 4) *E. similaris* Gent. (Symbols identified in text).

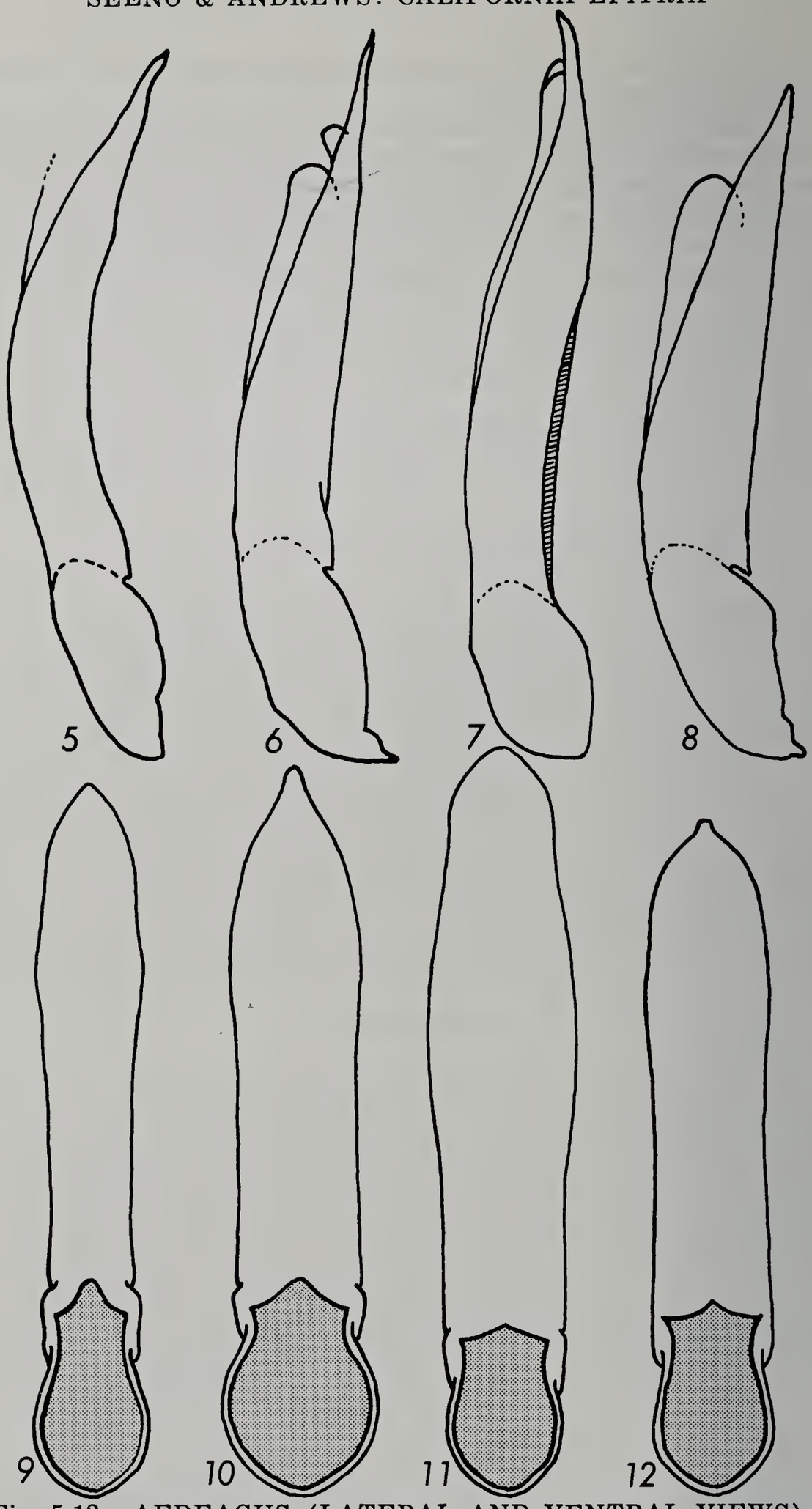

Fig. 5-12. AEDEAGUS (LATERAL AND VENTRAL VIEWS): 5,9 *Epitrix hirtipennis* (Melsh.): 6,10 *E. similaris* Gentner; 7, 11 *E. subcrinita* (LeConte); 8,12 *E. tuberis* Gentner.

Key to California Species of *Epitrix* (based on external morphology)

1. Upper surface black or nearly so, lacking brassy metallic luster 2
1′. Upper surface not black; either pale brownish yellow or reddish to dark brown with brassy metallic luster 3

2(1). Eyes prominent, their combined width (at the widest points) when viewed from the top usually greater than 75% of the least interocular distance. Pronotal disc feebly convex, scarcely narrowed anteriorly. Elytral disc moderately convex, lateral margins broadly arcuate. (central to southern California, usually coastal) ..... *similaris* Gentner
2′. Eyes not prominent, their combined width (at the widest points) when viewed from the top usually less than 75% of the least interocular distance. Pronotal disc convex, somewhat narrowed anteriorly. Elytral disc only feebly convex and lateral margins somewhat subparallel. (northern California) ..... *tuberis* Gentner

3(1′). Elytra brownish yellow. Antebasal impression shallow to feeble, noticeable but not strongly impressed. (throughout California) ..... *hirtipennis* (melsheimer)
3′. Elytra reddish to dark brown with a brassy metallic luster. Antebasal impression moderately deep and well defined. (throughout California) ..... *subcrinita* (LeConte)

Key to California Species of *Epitrix* (based on the Spermatheca)

1. Receptacle oval and entirely without constrictions or sinuations near middle (Fig. 1 & 2) (Points of attachment to the pump may be sclerotized or ringed) 2
1′. Receptacle not oval but constricted and sinuate in the middle (Fig. 3 & 4) 3

2(1). Length of pump less than length of either receptacle or sclerotized spermathecal duct (Fig. 1) ..... *hirtipennis* (Melsheimer)
2′. Length of pump greater than length of either receptacle or sclerotized spermathecal duct (Fig. 2) ..... *tuberis* Gentner

3(1′). Receptacle sinuate dorsally, concave or saddle shaped. Sclerotized spermathecal duct broadly arched, the straightened out length sub-equal to length of receptacle. Distal end of pump pointed to form a small appendix (Fig. 3)..... ..... *subcrinita* (LeConte)
3′. Receptacle constricted, somewhat peanut shaped. Sclerotized spermathecal duct not broadly arched, the length approximately half the length of the receptacle. Distal end of pump rounded without appendix (Fig. 4) ..... *similaris* Gentner

EPITRIX HIRTIPENNIS (Melsheimer)
(Fig. 1, 5, 9, 13)
Crepidodera hirtipennis Melsheimer 1847:165.

Adult: Head and pronotum light reddish brown, thorax and abdomen brownish, elytra brownish yellow with brown band across elytra at center. Antebasal impression feeble. Body length 1.9mm.
Spermatheca: Length approx. 0.26mm. Receptacle oval, without constriction. Point of contact between pump and receptacle heavily sclerotized almost collar like. Gland valve somewhat feeble.

Fig. 13: California distribution of *Epitrix hirtipennis*.

EPITRIX SIMILARIS Gentner
(Fig. 4, 6, 10, 14)
Epitrix similaris Gentner 1944:142-143.

Adult: Black to reddish black. Antenna brownish yellow near base, outer

joints gradually becoming darker. Legs reddish brown becoming lighter towards tarsi; antebasal impression well marked and almost parallel (except near center) with base of pronotum. Body length 2.0mm.
Spermatheca: Length approx. 0.33mm. Receptacle constricted, peanut shaped. Gland valve prominent.

EPITRIX SUBCRINITA (LeConte)
(Fig. 3, 7, 11, 15)

Haltica subcrinita LeConte 1860:68.

Adult: Dark reddish brown with metallic lustre. Antenna yellowish brown near base, outer joints gradually becoming darker. Last antennal segments nearly the color of the elytra. Antebasal impression moderately deep and nearly straight. Body length 2.1mm.

Fig. 14: California distribution of *E. similaris* and *E. tuberis*.

Spermatheca: Length approx. 0.28mm. Receptacle concave, saddle shaped. Gland valve prominent. Sclerotized spermathecal duct curved and so long that it is subequal in length to the receptacle. Distal end of pump with small appendix.

EPITRIX TUBERIS Gentner
(Fig. 2, 8, 12, 14)
Epitrix tuberis Gentner 1944:137-142.

Adult: Black to reddish black. Antenna brownish yellow near base, outer joints gradually becoming darker. Legs reddish brown becoming lighter towards tarsi. Antebasal impression well marked and deep; arcuate and subparallel with base of pronotum. Body length 2.0mm.
Spermatheca: Length approx. 0.19mm. Receptacle oval, without constriction. Pump longer than receptacle or sclerotized spermathecal duct. Gland valve very prominent.

Fig. 15: California distribution of *E. subcrinita*.

COMPARISON OF:

Epitrix similaris Gent.	*Epitrix tuberis* Gent.
DISTRIBUTION: California: Sacramento south to San Diego county, mainly coastal.	DISTRIBUTION: California: Siskiyou and Del Norte counties; north into Oregon, Washington and British Columbia; east to Colorado and Nebraska.
SPERMATHECA: Pump shorter than the receptacle: receptacle constricted in center (peanut shaped).	SPERMATHECA: Pump longer than the receptacle: receptacle not constricted in center (egg shaped).
EYES (viewed from top): Combined width usually more than 75% of interocular distance.	EYES: Combined width usually less than 75% of interocular distance.

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